SCHOOLS

‘Let children learn by doing’

R Krithika

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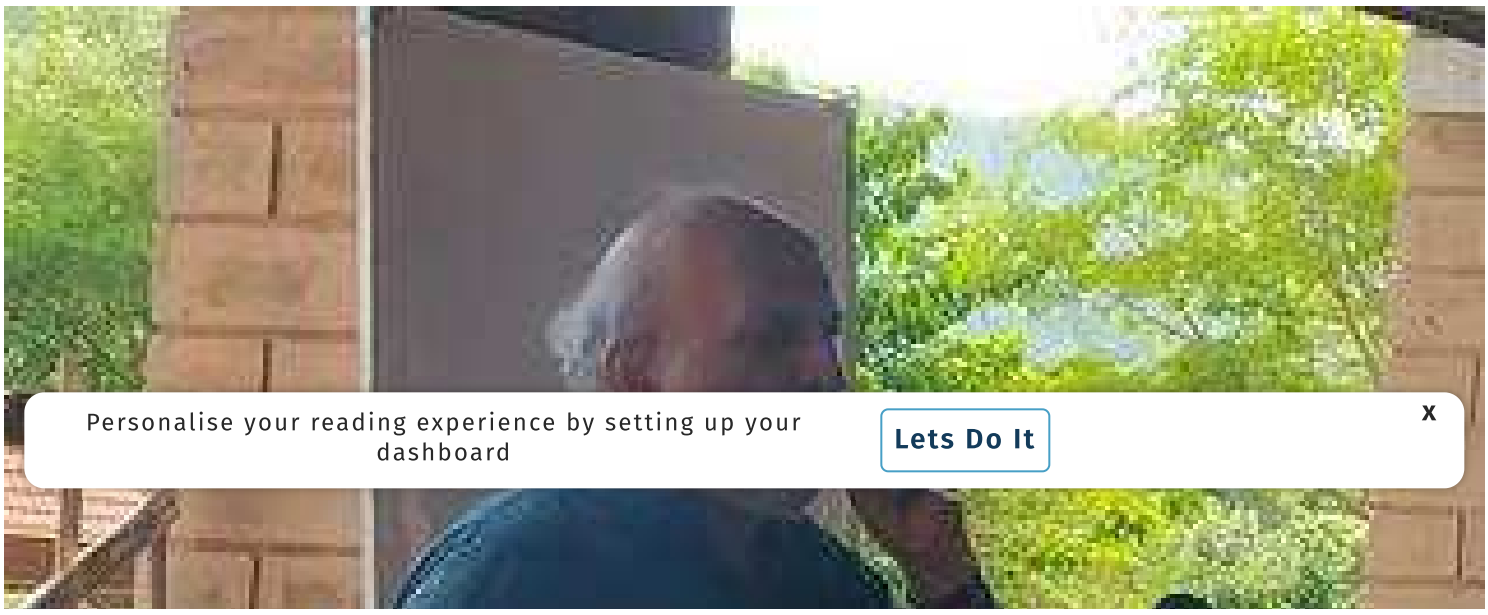
Renowned scientist and educator Arvind Gupta shows how science and maths can be taught with basic and simple toys

The slight elderly man snipped the corner of a plastic straw — the kind that you’re not supposed to use any more but still see plenty of — and put it to his lips and blew. The result: a trumpet-like noise. As he kept snipping at the length, the pitch changed; it became higher. As his excited audience — comprising teachers and students — began to chatter, Arvind Gupta laughed in sympathy. “Let children learn by doing,” he exhorted. “And they will teach you.”



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His next experiment also featured a straw. He made a few holes along its length and blew into one end as he opened and closed the holes with his fingertips. And you had a rudimentary flute. "*Thodi besuri hai par hai bansuri*," he smiled, punning on *besuri* (out of tune) and *bansuri* (flute).

The renowned scientist, toy inventor and educator was in the city for a workshop at Vidya Vanam Senior Secondary School, Anaikatti. He punctuated his demonstrations with pithy asides on education, on how science is connected to our daily lives, and stories. Like this one about the famous Maria Montessori. We all know her as the founder of the Montessori system of education but did you know that she was also was the first woman to become a medical doctor in Italy?

The story goes thus: A priest, who was interested in her work, would visit the Montessori centre with treats for the children. One day he took biscuits and distributed them. One little girl, who had been working on a puzzle with great intensity, took the biscuit and fitted it into a rectangular hole. "Her concentration was so focused that she only saw the biscuit as something to work with and not as a treat."

Some string and a matchbox | Photo Credit: R Krithika

When asked how he got interested in the science of toy making, he took us back to his childhood. “My parents were uneducated; my father had a soap factory. He made losses all his life. My mother was not sent to school though her brothers made it big. I come from Bareilly in North India.” Though his siblings and he went to school, “we had no money, so we made our own toys. And we had a very nice mother who never asked us ‘have you done your homework?’, ‘what about exams?’ I had an old battered suitcase full of things, with which I would play with for hours. My mother would say, ‘he’s happy. Let him be’. That’s how I got interested in all this. I owe it to my mother.”

Toys from trash

- Arvind Gupta demonstrated ways to make toys — ranging from a Newton disc to a basic motor — with what most of us would consider junk: plastic straws, matchboxes, wire, string, paper of all kinds, safety pins, empty juice cartons, wires, rubber from discarded tyres ... “Plastic is an environmental nightmare but very good to make models like these.”
- An aluminium hangar bent to an elliptical shape and a coin balanced on the hooked end was used to demonstrate how the planets revolve around the sun.
- Bits of coloured plastic and a twisted wire was transformed into a multi-coloured wriggly worm that beat slither.io any day
- A simple motor was made from a size D battery, two safety pins, a couple of magnets, some wire and a 1-inch tube from an old cycle tube. The modern fidget spinner became an electricity generator. A buzz rose as it lit up a tiny LED bulb.
- With matchboxes, and paper, you could have lizards climbing a vertical wall or a rabbit hopping across a horizontal surface.
- Discarded juice and milk cartons make excellent material for waterproof models, he laughed. “All it takes are a few snips with the scissors.” A transportable cup and a purse with multiple compartments were only a couple of the different things that could be made.
- For those interested in more visit **http://www.arvindguptatoys.com/**

“Forget science labs. What schools need are activity centres where children work with their hands. Folding paper is a geometry lab. You have no idea how much maths there is in paper craft.”

With that he showed off a flexagon, a rocket launcher and four kinds of caps made from a single newspaper sheet. The last cap opened out into the model of a boat and when the edges and the triangle was torn off, it became a life jacket.

“All these are available online on my website,” he told the children. “There are books, photos and videos on all of them,” Later he added, “There’s no point showing the children the videos and expecting them to replicate what they see. Only when they work their hands will they be motivated to see the videos. Not the other way around. What they do with their hands will reach their brain and heart.”

When I asked him for his definition of scientific temper, he quoted the Buddha: *Believe nothing/Merely because you have been told to/Or because it is traditional/Or because you*

and benefit/The welfare of all beings/That doctrine/Believe and cling to and take it as your

goal. “Test everything, question everything. The power to question... that is true scientific temper.”